posed of Chlamydomonas, Pleurococcus, various blue-green algae, Myxophyceae, and diatoms. The animals of the "vader" and these algae are of enormous importance in reclaiming land from the sea. A chapter is devoted to the enalids, that is, the plants of submerged meadows, among which Zostera, Ruppia, and similar plants dominate.

An entire chapter is devoted to the ecology of *Salicornia herbacea* (another evidence of the thorough treatment of the book), which is the pioneer emergent plant of the salt marsh; its upper line is determined by the tide, since over three hours of complete emergence seems detrimental. Beyond the Salicornia zone are various halophytic plants, largely grasses, whose distribution varies largely with soil changes. Sand-binding grasses like *Glyceria maritima* dominate in the sandy marshes of this type. In the chapter which compares the salt marshes of the North and East seas, it is noted that the North Sea flora is much more halophytic than is that of the less salty East Sea. It is very curious, however, that some true halophytes of the East Sea region are not known from the North Sea. Reed swamps of Phragmites, Scirpus, etc., are found in brackish waters (up to 3 per cent. salt). Of much interest are the bacterial swamps in which the purple sulfur bacteria and Beggiatoa dominate; these occur of course where there is decaying vegetation. A chapter is devoted to the unevennesses of salt marshes (such as mounds formed by ants, moles, etc.), and their vegetation, which differs much from the ordinary flora of the marsh. The influence of artificial land reclamation is the subject of another chapter; dike-building soon results in the disappearance of salt from the marshes, and the development of the vegetation into an artificial meadow. The final chapters deal with the ecological characteristics of halophytes. Most species are hapaxanthic turf-builders. Woody plants are missing except for two half-shrubs. Succulence and leaf isolaterality are common. The flowers are largely wind-pollinated, and the seeds are scattered more by water currents than by other means. The thoroughness of this work makes us long for the other members of the series.—H. C. COWLES.

A new textbook of biology

That the teaching of biology in secondary schools has not yet reached an accepted method is evident with the appearance of each new textbook. Formerly courses in general biology were recommended, without any separation into botany and zoology. Later it became more common to offer unit courses in zoology, or botany, or physiology. During all this time, however, there have been adherents to the elementary course in general biology, and some excellent arguments for such a course have been recognized by almost every teacher.

In a recent book by HUNTER[2] we have another attempt to solve this problem. It is intended to present botany, zoology, and human physiology in one course to students in the first year of the high school, and has been used in the New

[2] HUNTER, GEORGE WILLIAM, Elements of biology. pp. 445. New York: American Book Company. 1907.

York city schools. The sequence is botany (146 pp.), zoology (139 pp.), and human physiology (124 pp.). Preceding the presentation of botany, there is an introductory chapter, another on "Experiments in chemistry and physics," and a third on "Protoplasm and the cell." Evidently there is no attempt to follow the older type of courses in general biology, but rather to present in one book short courses in the three sciences. Directions for experiments accompany the discussions of the text and are often not dissociated from them. The preface states that "it would not be wise to attempt all of the work outlined in this book;" and also, "it is thought that each successive chapter, although related to that immediately preceding it, is yet distinctive enough to allow of the omission of a chapter or chapters without in any way interfering with the continuity of the work." This universal plasticity suggests a general lack of organic relationship.

The botany begins with a chapter on flowers. The first two pages are almost entirely filled with fine print, which the author says in his preface is "less important;" and with this luminous beginning we find on the third page the astonishing title "Fertilization of flowers," in connection with which appear diagrams and terms presenting ovules, embryo sac, eggs, pollen grains, and pollen. The attitude of mind which makes possible the attempt to present this difficult topic in this way is shown, not only by the misleading title given above, but by the following sentence: "The first beginning of the growth of the seed takes place at the moment of fertilization." The remainder of the chapter discusses pollination; and then follow chapters on "Fruit" and "Seeds and seedlings." It is not until the seventh chapter that there is any discussion of the structure or functions of the working parts of the plants. Even then the chapter on "Roots and their work" is followed by a chapter on "Buds and stems," instead of the chapter on "Leaves and their functions." In such an arrangement no close working relation is developed between the different regions. Ecology is presented in one chapter (8 pp.), and the botany closes with a somewhat long chapter on "Flowerless plants."

If throughout this part of the book there were evident an attempt to correlate the material with that of zoology or physiology, we might understand the plan, but no such correlation appears; in fact there is not even any correlation of the botanical material itself. Furthermore, the statements are often faulty. In defining matter, the author says: "It may be living, or may have been alive at some previous time, in which case we speak of it as organic matter; or it may never have been alive. The latter state of matter is called inorganic." Under the topic "chloroplasts," the process of photosynthesis is discussed, and in italics the statement is made that "the chloroplasts, by means of the energy received from the sun, manufacture starch out of certain materials." An accompanying diagram, labeled "Diagram to illustrate the formation of starch," attempts to visualize the process; but not a word appears to indicate that starch is not formed directly by chloroplasts, or that anything besides starch is made by photosynthesis.

The treatment of zoology is from the standpoint of increasing complexity, from Protozoa to Mammalia. For this subject the author is equipped, so that probably it is free from such faults as have been indicated in the chapters on

botany. The section on human physiology attempts to cover all the important topics, and meets the demands of certain state laws by indicating the effects of alcohol. The absurd extent to which this may be carried is shown in the chapter on "The nervous system," in which ten pages are given to alcoholism and eight to the entire nervous system.—OTIS W. CALDWELL.

Wettstein's Handbuch [3]

A third instalment of WETTSTEIN'S *Handbuch* contains a general discussion of the angiosperms and a special taxonomic treatment of the choripetalous dicotyls. The next and final instalment, which is promised in the spring of 1908, will deal with the rest of the dicotyls and with the monocotyls. After a presentation of the general morphology of angiosperms, the writer discusses their phylogeny. He believes that the monocotyls have been derived from the dicotyls, and that among the dicotyls the Monochlamydeae contain the most primitive forms. Consequently, they would be most likely to show characters which might indicate relationship with groups below. The pollen-tube structures and the flowers of angiosperms are thought to indicate a gymnosperm origin. It is not claimed that the flowers of living gymnosperms and angiosperms furnish an easy transition, but merely that the types can be reconciled both morphologically and ecologically. The Choripetalae are arranged in thirteen series, beginning with the Verticillatae, Casuarinaceae being the lowest family, and ending with the Centrospermae, in which the Caryophyllaceae are the highest family. The Dialypetalae contain twelve series, beginning with the Polycarpicae, Magnoliaceae being the lowest family, and ending with the Umbelliflorae. The description of families is full and clear and profusely illustrated with excellent figures, many of which are new.—CHARLES J. CHAMBERLAIN.

MINOR NOTICES

Das Pflanzenreich.[4]—Parrt 30 contains the Styracaceae, prepared by JANET PERKINS. After the usual introductory account of the characters and geographical distribution of the family, the six genera are presented as follows: Pamphilia (3 spp., 1 new), Styrax (97 spp., 11 new), Bruinsmia (2 spp.), Alniphyllum (3 spp.), Halesia (3 spp.), and Pterostyrax (3 spp., 1 new).

Part 31 contains the Potamogetonaceae by ASCHERSON and GRAEBNER, prefaced by an unusually full account of the structure and habits of this interesting family. The systematic presentation is as follows: Zostereae containing Zostera

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[3] WETTSTEIN, DR. RICHARD R. v., Handbuch der systematischen Botanik. II Band. 2 Theil (erste Hälfte). pp. 161–394. *figs. 165* (995). Leipzig und Wien: Franz Deuticke. 1907. *M* 9.

[4] ENGLER, A., Das Pflanzenreich. Heft 30. Styracaceae von J. PERKINS. pp. 111. *figs. 18* (191). *M* 5.60. Heft 31. Potamogetonaceae von P. ASCHERSON und P. GRAEBNER. pp. 184. *figs. 36* (221). *M* 9.20. Leipzig: Wilhelm Engelmann. 1907.